Exhibit I

(REDACTED VERSION OF DOCUMENT TO BE SEALED)

Exhibit 42
(Submitted Under Seal)

UNITED STATES DISTRICT COURT

FOR THE EASTERN DISTRICT OF MICHIGAN

JASON COUNTS, *et al.*,

Plaintiffs,

v.

Case No. 1:16-cv-12541-TLL-PTM

GENERAL MOTORS LLC,
ROBERT BOSCH GMBH, and
ROBERT BOSCH LLC,

Defendants.

Expert Report of Eric T. Bradlow

June 5, 2020

Confidential - Subject to Protective Order

Table of Contents

I.   Qualifications

1.   I am the K.P. Chao Professor, Professor of Marketing, Statistics, Education and Economics, Chairperson of Wharton's Marketing Department, and Vice-Dean of Analytics at The Wharton School of the University of Pennsylvania. I received my Ph.D. and M.S. degrees in Statistics from Harvard University and my B.S. degree in Economics from The Wharton School. In my research and other work, I use a variety of techniques, including statistical models, to solve problems on everything from advertising impact and effectiveness, advertising design, Internet search engines, optimizing product design to meet consumer preferences, product bundling, product pricing, customer lifetime value, in-store retailing, customer choice and heuristic decision making, brand value, and issues around product assortment. Specifically, my research interests include Bayesian modeling to understand heterogeneity in consumers, marketing science methods around sampling, clustering, and market positioning, statistical computing, and developing new methodology for unique data structures with application to business problems. My curriculum vitae is attached as Appendix A.

2.   I am a fellow of INFORMS Society for Marketing Science, a fellow of the American Statistical Association, and a fellow of the American Educational Research Association. I am a past chair of the American Statistical Association Section on Statistics in Marketing, past Editor-in-Chief of *Marketing Science—*the premier quantitative journal in the field, a past statistical fellow of Bell Laboratories, and I worked full time at DuPont Corporation's Corporate Marketing and Business Research Division and the Educational Testing Service.

3.   My research has been peer-reviewed and published in top-tier academic journals such as the *Journal of the American Statistical Association*, *Psychometrika*, *Statistica Sinica*, *Chance*, *Marketing Science*, *Management Science*, and *Journal of Marketing Research*. I also serve as Area Editor for the *Journal of the American Statistical Association* and the *Journal of Marketing Research*, and I am on the Editorial Boards of *Marketing Letters*, *Marketing Science*, *Journal of Marketing Research*, *Quantitative Marketing and Economics*, and the *Journal of Consumer Research.*

4.   I have published papers on advertising effectiveness, advertising content design, content analysis, consumer choice, the use of natural language processing to understand consumer sentiment and attribute importance, survey design and its impact on consumer response, inferring customer attribute importance and its impact on product choice, and other topics among my many publications.[1] In particular, my research includes an analysis of how consumers purchase cars and whether visual influence plays a role (in addition to functional and economic considerations) in the purchase process.[2] I have also published two books, *Testlet Response Theory and Its Applications,* which relates to the work that I did while at the Educational Testing Service, and *Marketing for Financial Advisors*, which relates to how financial advisors can use information collected from their clients (*e.g.,* focus groups, surveys, and transactional data) to build their brands and market themselves.[3]

5.   I have won numerous teaching awards at Wharton, including the Anvil Award, MBA Core Curriculum teaching award, the Miller-Sherrerd MBA Core Teaching award, the MBA Excellence in Teaching Award and the Lindback Award for Lifetime PhD Teaching and Mentoring. My teaching at Wharton has included a variety of marketing courses, including MBA and undergraduate classes in Marketing Research Methods, MBA courses in Dynamic Marketing Strategy, Principles of Marketing, Statistical Methods and Sampling, and PhD level classes in Data Analysis and in Empirical Methods in Marketing.

6.   I have an extensive teaching record to executives including being the founder and faculty lead of the Google-Wharton Marketing Academy, the premier offsite marketing academy to train

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[1] *See, e.g.,* Thomas Y. Lee and Eric T. Bradlow, "Automated Marketing Research Using Online Customer Reviews," *Journal of Marketing Research* 48(5), 2011; David A. Schweidel, Eric T. Bradlow, and Patti Williams, "A Feature-Based Approach to Assessing Advertisement Similarity," *Journal of Marketing Research* 43(2), 2006; Pierre Chandon, J. Wesley Hutchinson, Eric Bradlow, and Scott Young, "Does In-Store Marketing Work? Effects of the Number and Position of Shelf Facings on Brand Attention and Evaluation at the Point of Purchase," *Journal of Marketing* 73(6), 2009.

[2] Blakeley B. McShane, Eric T. Bradlow, and Jonah Berger, "Visual Influence and Social Groups," *Journal of Marketing Research* 49(6), 2012.

[3] Howard Wainer, Eric T. Bradlow, and Xiaohui Wang, *Testlet Response Theory and Its Applications*, 1st Edition (Cambridge, United Kingdom: Cambridge University Press, 2007); Eric T. Bradlow, Keith E. Niedermeier, and Patti Williams, *Marketing for Financial Advisors*, 1st Edition (New York, NY: The McGraw-Hill Companies, Inc., 2009).

Google's elite rising stars. I currently teach a variety of marketing topics such as the Essentials of Marketing, Marketing Strategy, and Data Analytics.

7.   I am currently the Chief Research Officer and Co-Founder of GBH Insights, a marketing research, analytics, and business intelligence company. My role is to supervise all aspects of our customer product work including focus groups and qualitative research, primary marketing research, sampling and survey design, segmentation and marketing sciences work, data science and analytics work, and custom application of statistical methods.

8.   I am being compensated at my standard billing rate of $1,200 per hour. I have not testified as an expert witness during the last four years. Staff at Cornerstone Research, a consultancy, worked under my direction and helped me prepare my report. I may also receive compensation from Cornerstone Research based on its collected staff billings for its support of me in this matter. Neither my compensation in this matter nor my compensation from Cornerstone Research is in any way contingent or based on the content of my opinion or the outcome of this or any other matter.

II.   Case Background And Plaintiffs' Allegations

9.   General Motors LLC ("GM") designs, manufactures, and markets a wide variety of automobiles throughout the world.[4] GM's brands include Chevrolet, Buick, GMC, and Cadillac.[5] Each of these vehicle brands has various models, or nameplates, associated with it. For example, the Chevrolet brand includes a number of different models associated with passenger vehicles (such as sedans and coupes), trucks, and sport utility vehicles. The specific model at issue in this matter is the Chevrolet Cruze Turbo Diesel, which GM began producing with the 2014 model year.

10.   The plaintiffs in this case focus on model years 2014 and 2015 Chevrolet Cruze Turbo Diesel vehicles ("Subject Vehicles"). In particular, they claim that the Subject Vehicles' emissions

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[4] First Amended Class Action Complaint, *Jason Counts, et al. v. General Motors LLC, et al.,* Case No. 1:16-CV-12541-TLL-PTM, filed June 11, 2018 ("Complaint"), ¶ 38–39.
[5] "Vehicle Brands," General Motors, available at https://www.gm.com/our-brands, accessed June 5, 2020.

system contains a "defeat device" that causes the Subject Vehicles to emit more pollutants in real world driving conditions than what GM had advertised and what a "reasonable consumer" would expect.[6] Plaintiffs further allege that GM never disclosed to consumers that the Subject Vehicles contain the alleged defeat device and that the Subject Vehicles' emissions allegedly exceeded applicable emissions limits in real-world driving conditions.[7]

11.   I understand that plaintiffs are seeking to represent a class of all persons who purchased or leased a Subject Vehicle ("Subject Vehicle Purchasers").[8] Plaintiffs claim that if Subject Vehicle Purchasers would have known (when they purchased or leased their Subject Vehicles) of either the vehicles' higher emissions or the alleged effects on fuel economy if the emissions were not manipulated, then they either would not have purchased or leased those vehicles or would have paid less for the vehicles than they paid.[9]

III.   Assignment And Materials Considered

12.   Counsel for GM has asked me to review, evaluate, and respond to the Declaration of Venkatesh Shankar, Ph.D., who was retained by counsel for plaintiffs in this matter.[10] In particular, I was asked to evaluate whether Dr. Shankar or plaintiffs (via analysis related to Dr. Shankar) conducted the appropriate analyses to determine if the alleged omissions related to the Subject Vehicles' emissions systems impacted consumer purchase or lease decisions. In addition, I was also asked to opine on the academic literature concerning the factors that may influence consumer purchase and lease decisions for automobiles.

13.   I hold all of my opinions to a reasonable degree of professional and scientific certainty. My work in this matter is ongoing. I reserve the right to revise or supplement my opinions in light of any additional materials including data, documents, declarations of experts, and deposition or

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[6] Complaint, ¶ 2, 20–22.
[7] Complaint, ¶ 16, 24, 96–115.
[8] Complaint, ¶ 229.
[9] Complaint, ¶ 218.
[10] Declaration of Venkatesh Shankar, Ph.D., November 6, 2019 ("Shankar Declaration").

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other testimony, or if I am asked to perform further research or analysis. A complete list of the documents that I have considered in forming my opinions to date is attached to this report as Appendix B.

IV.   Summary Of Opinions

14.   Dr. Shankar's opinions relate solely to *GM's* marketing strategy, marketing intentions, and advertising campaigns. Dr. Shankar did not do any research into *consumers'* preferences or perceptions related to diesel vehicle emissions; did not conduct any studies to establish that the emissions features of the Subject Vehicles were important to consumers; and did not perform any research to test whether the disclosure of the alleged omissions in this case would have influenced consumers' purchase or lease decisions.

15.   The analysis and opinions offered by Dr. Shankar are focused solely on *GM's* marketing and advertising, and cannot reliably be used to assess consumer preferences or the impact of an alleged omission on consumers' purchase or lease decisions. To assess such preferences and impacts, properly designed and robust marketing research that adheres to the tenets of the scientific method would be required. Neither Dr. Shankar, nor any other plaintiff expert (that I am aware of), conducted such research.

16.   While no expert has conducted the empirical research necessary to determine whether disclosure of the alleged omissions about the Subject Vehicles would have had an influence on consumer behavior, extensive peer-reviewed literature and industry research demonstrate that there is substantial heterogeneity in all aspects of a vehicle purchase or lease decision, including individualized issues relating to consumer preferences for vehicle attributes, information sources considered, search processes used, and decision strategies. Thus, it cannot be reasonably assumed,

and is in fact highly unlikely, that the alleged omissions would have resulted in a common impact on consumer purchase or lease decisions.[11]

V. Dr. Shankar Provided No Opinions, Analyses, Or Conclusions Relating To Consumer Preferences, Consumer Perceptions, Or The Impact Of The Alleged Omissions On A Consumer's Purchase Or Lease Decision.

17.   Dr. Shankar's report focused exclusively on GM's marketing conduct. He conducted what he described as a "content analysis" of the "themes" in GM's affirmative advertisements,[12] reviewed internal GM documents related to its marketing strategy, and evaluated GM's advertising spend.[13] He did not do any research into *consumers'* preferences or perceptions related to diesel vehicle emissions; he did not conduct any studies to establish that the emissions features of the Subject Vehicles were important to consumers;[14] and he did not perform any research to test whether the disclosure of the alleged omissions in this case would have influenced consumers' purchase or lease decisions.[15]

18.   As a matter of marketing methodology, Dr. Shankar's analysis of *GM's* intentions and advertising themes is not a reliable basis upon which to reach conclusions regarding what was actually important to consumers' purchase or lease decisions, or what information would alter those purchase or lease choices. Furthermore, due to their unreliable nature, such analyses should

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[11] In fact, two of the ten named-plaintiffs, Jason Counts and Oscar Zamora, directly admitted in deposition that they would still purchase their Class Vehicles given their current knowledge of the alleged defect. *See* Deposition of Jason Counts, October 1, 2018 ("Counts Deposition"), p. 131:8–14 ("Q: Given what you know today about your Cruze…you would still go back and purchase the Cruze? A: Yes, I likely would still purchase a Cruze today."); Deposition of Oscar Zamora, May 12, 2019, p. 97:17–21 ("Q: So if the complaint said that you-if you had known about higher emissions, that certain plaintiffs would not have purchased or leased their vehicles, that wouldn't be applicable to you, right? A: Correct.").

[12] I understand that Dr. Kimberly Neuendorf, a recognized expert in content analysis, analyzed Dr. Shankar's content analysis and concluded that the results of Dr. Shankar's content analysis cannot reliably be used to support his conclusions that GM made extensive use of the three themes of power/performance, fuel efficiency, and environmental friendliness in its marketing of the Subject Vehicles. *See* Expert Report of Kimberly A. Neuendorf, June 5, 2020.

[13] *See, e.g.*, Shankar Declaration, ¶¶ 6, 22, 41–42, and Table 1.

[15] In fact, Dr. Shankar did not even analyze whether the affirmative representations he calls out in his report influenced *consumer* decisions. At his deposition, Dr. Shankar confirmed that he did not conduct a survey of Subject Vehicle Purchasers regarding their perceptions of GM ads. Dr. Shankar did not even interview a single consumer regarding their perception of GM ads. *See* Deposition of Venkatesh Shankar, January 23, 2020, pp.62:21–63:2.

not be used by practitioners or researchers to make such assessments. Market research performed by a company and advertisement content might indicate what *that company* thought may be important to consumers, however, without rigorous scientific testing and empirical data about consumers' actual preferences, perceptions, or decision making processes, one cannot tell whether it *did* influence consumers' purchase and lease decisions on an individual basis—let alone across all consumers. As I explain below in Section VI, the academic literature, market research, and case documents demonstrate that consumers differ in the vehicle attributes they prefer, the information they consider when purchasing or leasing a vehicle, the way they make purchase or lease decisions, and across many other dimensions. Given this heterogeneity and complexity of decision making, an empirical analysis of *consumers* is required to determine what was important to them and what actually influenced their purchase or lease decisions, including whether GM's marketing had an impact.

19.   There are a variety of empirical methods that marketing experts (in industry and in academia) consider in determining how to assess these consumer preference and consumer impact questions in a rigorous and scientific manner, depending on context, including market data, surveys, experiments, and/or individualized inquiries.[16] Dr. Shankar, to my knowledge, has used none of them here.

VI.   There Is Substantial Heterogeneity In All Aspects Of A Consumer's Vehicle Purchase or Lease Decision

20.   Although neither Dr. Shankar, nor any other plaintiff expert, has presented any scientific market research on the purchase or lease decision process of Subject Vehicle buyers, extensive academic literature and industry research establishes that consumers' decisions to purchase or lease any vehicle involve many different considerations and steps, almost all of which will vary on an individual consumer-by-consumer basis. The following discusses the individual issues that

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[16] Philip Kotler and Kevin Lane Keller, *Marketing Management*, (Harlow, England: Pearson Education Limited, 2016), p. 126.

pervade various aspects of the consumer purchase or lease decision and any determination of whether a given consumer will be impacted by a particular disclosure or non-disclosure.

21.   **Consumer Preferences**: According to the academic literature, consumers vary in their characteristics and have different preferences about the vehicles they consider and purchase.[17] Vehicles are complex and highly differentiated products, causing consumers to make trade-offs across a multitude of different features when deciding which vehicle to purchase.[18] Vehicles differ across many dimensions, including fuel efficiency, size, style, and brand.[19] Some consumers care strongly about reliability, while others are concerned about performance.[20] Some consumers are brand-loyal, while others like to try new brands.[21] Some consumers are in the market for a luxury car with the newest technologies, while others are on a budget and only want an economy car.[22]

22.   **Information Sources Considered:** Due to the complexity and the differentiation in vehicles available, as well as the sheer cost of a vehicle, the vehicle purchase or lease process can be characterized as a "high-involvement" decision.[23]   When they make high-involvement decisions, consumers typically spend a considerable amount of time gathering information and

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[17] For example, named plaintiff Derek Long focused on longevity among other factors. When asked why he looked specifically at diesel vehicles, Mr. Long responded that he was looking for "…reliability and the longevity…. [that he] was putting a lot of miles on, and diesel, typically, has a higher reliability in longevity." Deposition of Derek Long, June 4, 2019 ("Long Deposition"), p. 118:2–11. Whereas, named plaintiff Jason Counts stated that the "key thing [he] was looking for was fuel economy." Counts Deposition, p. 85:24–25. I understand also that Mr. Long purchased an aftermarket product for his Subject Vehicle that disabled or reduced portions of the vehicle's emissions system. *See* Long Deposition, pp. 131:21–133:10. To the extent that other Subject Vehicle Purchasers purchased or leased similar products knowing that portions of their Subject Vehicle's emission system would be disabled or reduced, this demonstrates that one cannot assume that all Subject Vehicle Purchasers had a common preference for the emissions component of the vehicle. In the marketing and economics fields, such data are known as revealed preference data. *See, e.g.,* Hal R. Varian, *Intermediate Microeconomics: A Modern Approach*, (New York, NY: W. W. Norton & Company, 2014), p. 119.

[18] *See, e.g.*, Thomas Klier and Joshua Linn, "Technological Change, Vehicle Characteristics, and the Opportunity Costs of Fuel Economy Standards," MIT Center for Energy and Environmental Policy Research, December 2013, pp. 3–4, 30; David Greene, Anushah Hossain, Julia Hofmann, Gloria Helfand, and Robert Beach, "Consumer Willingness to Pay for Vehicle Attributes: What is the Current State of Knowledge?", U.S. Environmental Protection Agency, December 2018.

[19] *See, e.g.,* Steven Berry, James Levinsohn, and Ariel Pakes, "Automobile Prices in Market Equilibrium," *Econometrica* 63(4), 1995, pp. 841–890 at pp. 841, 844, and 873.

[20] Brenda H. Vrkljan and Dana Anaby, "What Vehicle Features are Considered Important When Buying an Automobile? An Examination of Driver Preferences by Age and Gender," *Journal of Safety Research* 42, 2011, pp. 61–65 at pp. 63–64.

[21] Richard L. Oliver, "Whence Consumer Loyalty?" *Journal of Marketing* 63, 1999, pp. 33–44 at p. 36–37.

[22] Fred Mannering, Clifford Winston, and William Starkey, "An Exploratory Analysis of Automobile Leasing by US Households," *Journal of Urban Economics* 52(2002), 2001, pp. 154–176 at pp. 167–168, 170.

[23] *See, e.g.*, "Low-Involvement Versus High-Involvement Buying Decisions and the Consumer's Decision-Making Process," in *Principles of Marketing*, (Minneapolis, MN: University of Minnesota Libraries Publishing, 2010), pp. 76–84.

comparing alternatives.[24] Consumers vary in the types of information sources they consider, the amount of time they spend to gather the information, and the value they assign to each source.[25] Based on my experience, common sources of information for purchasing or leasing a vehicle include the salesperson at the dealership, friends and family, consumer guides, manufacturer websites, third-party websites, or magazine/ newspaper reviews. But which of these sources an individual consumer actually considers may vary consumer by consumer ███████████████████

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███

23.   **The Importance of Information Sources to Consumers:** In addition, even if consumers are exposed to the same information sources, they may place different weight on those different sources. In fact, based on my experience, many consumers do not find ads to be an influential source of information as compared to other sources of information.[28] This is also consistent with

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the record evidence.

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24.   **Sales Channels:** Consumers can also purchase or lease vehicles from a variety of different sales channels, such as traditional dealerships (franchised or independent), online buying services, manufacturers' websites, dealerships' websites, newspapers' websites, private sales, or auctions.[31] The selected sales channel can influence the types of information the consumers consider. Furthermore, different consumers may receive different information about the same vehicle they are considering depending on their selected sales channels. Some consumers have the inclination and the time to conduct in-depth research through third-party reviews and to test-drive a variety of makes and models at different dealerships, or even compare traditional dealerships to online buying services. Other consumers do not have time to conduct these activities.[32]

25.   **Prior Experience:** Prior experiences with vehicles can also have an impact on the vehicle purchase or lease decision. Some consumers who have had positive experiences with the vehicle they already own may be brand-loyal and choose a vehicle that is most similar to that vehicle.[33] These brand-loyal consumers tend to be repeat purchasers and may even refer other people to the manufacturer's product.[34] On the contrary, consumers who have had negative experiences with

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[29] [black redaction box]

[31] Jason Kuruzovich, Sivia Viswanathan, Ritu Agarwal, Sanjay Gosain, and Scott Weitzman, "Marketspace or Marketplace? Online Information Search and Channel Outcomes in Auto Retailing," *Information Systems Research* 19(2), 2008, pp. 182–201 at p. 184.

[32] Fiona Scott Morton, Jorge Silva-Risso, and Florian Zettelmeyer, "What Matters in a Price Negotiation: Evidence from the U.S. Auto Retailing Industry," *Quantitative Marketing and Economics* 9, 2011, pp. 365–402; Florian Zettelmeyer, Fiona Scott Morton, and Jorge Silva-Risso, "How the Internet Lowers Prices: Evidence from Matched Survey and Automobile Transaction Data," *Journal of Marketing Research* 43(2), 2006, pp. 168–181.

[33] Narasimhan Srinivasan and Brian T. Ratchford, "An Empirical Test of a Model of External Search for Automobiles," *Journal of Consumer Research* 18(2), 1991, pp. 233–242 at pp. 236, 240–241.

[34] Philip Kotler and Kevin Lane Keller, *Marketing Management*, 15th Edition (Harlow, England: Pearson Education Limited, 2016), pp. 163–164.

their vehicle or dealership may disregard that brand entirely and not consider any vehicles from that brand.[35]

26.   **Choice Processes:** In addition to the variation in information sources, sales channels, and personal experiences, consumers also differ in the types of strategies they use to process the information gathered and make a decision.[36] Consumers often take mental shortcuts, or heuristics, to simplify a complex decision.[37] Some consumers may follow what is known in the marketing literature as a lexicographic heuristic and choose their vehicle to maximize a particular attribute (*e.g.,* lowest price) without regard to other attributes.[38] Some may follow a satisficing heuristic, considering vehicles sequentially and eliminating vehicles that do not meet the cutoff for each attribute.[39] Others may determine whether individual features are good or bad for each vehicle and then compare the number of good and bad attributes across vehicles.[40] Thus, even consumers who considered the same information sources may, and in certain contexts typically do, choose different vehicles because they vary in their preferences and in the heuristics used. Indeed, as seen in the record, even consumers who purchase or lease the exact same vehicle model may have different reasons for why they selected that model.

27.   Given the well-established heterogeneity in vehicle purchase and lease decisions, it would be inappropriate to assume a common response to the disclosure of the omissions alleged here without some empirical proof and analysis showing why these omissions would allegedly provoke

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[35] Biljana Juric, Sandra D. Smith, and George Wilks, "Negative Customer Brand Engagement," in *Customer Engagement: Contemporary Issues and Challenges,* eds. Roderick J. Brodie, Linda D. Hollebeek, and Jodie Conduit, (Milton Park, UK: Routledge, 2016), pp. 278–289 at p. 282. *See also,* Daniel Newman "Customer Experience is the Future of Marketing," *Forbes,* October 13, 2015, https://www.forbes.com/sites/danielnewman/2015/10/13/customer-experience-is-the-future-of-marketing/#bd1cc4a193d5, accessed June 5, 2020 ("Marketing research has discovered that it takes 12 positive experiences to repair the damage caused by a single unresolved negative one. In today's competitive business environment, even one negative experience is enough to lose a customer forever because people now are less tolerant toward poor encounters than ever before").

[36] James R. Bettman, Mary Frances Luce, and John W. Payne, "Constructive Consumer Choice Processes," *Journal of Consumer Research* 25(3), 1998, pp. 187–217.
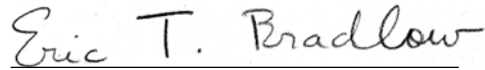
[37] Philip Kotler and Kevin Lane Keller, *Marketing Management*, (Harlow, England: Pearson Education Limited, 2016), p. 177.

[38] Philip Kotler and Kevin Lane Keller, *Marketing Management*, (Harlow, England: Pearson Education Limited, 2016), p. 177.

[39] James R. Bettman, Mary Frances Luce, and John W. Payne, "Constructive Consumer Choice Processes," *Journal of Consumer Research* 25(3), 1998, pp. 187–217 at p. 190.

[40] Joseph W. Alba and Howard Marmorstein, "The Effects of Frequency Knowledge on Consumer Decision Making," *Journal of Consumer Research* 14(1), 1987, pp. 14–25.

a common response, in contrast to the volumes of academic literature on this issue. No such empirical proof or analysis has been offered by plaintiffs or Dr. Shankar here.

Eric T. Bradlow

Professor Eric T. Bradlow

June 5, 2020

Appendix A

ERIC THOMAS BRADLOW

Work Address
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Education	HARVARD UNIVERSITY	Cambridge, MA
	Ph.D. in Statistics, November 1994 Cognate: Statistical Applications in Business and Marketing Research Thesis topic: Analysis of Ordinal Survey Data with No Answer Responses Advisor: Professor Alan M. Zaslavsky	
	HARVARD UNIVERSITY	Cambridge, MA
	A.M. in Statistics, March 1990	
	THE WHARTON SCHOOL, UNIV. of PENN	Philadelphia, PA
	Bachelor of Science in Economics, May 1988 - Major in Statistics	
Employment	THE WHARTON SCHOOL, UNIV. of PENN	Philadelphia, PA
	• Chairperson, Wharton Marketing Department, 2014- • K.P. Chao Professor, Professor of Marketing, Statistics, Education and Economics (tenured), July 2015- • Vice-Dean, Analytics at Wharton, 2019- • Vice-Dean and Director, Wharton Doctoral Programs, July 2009-2016 • K.P. Chao Professor, Professor of Marketing, Statistics, and Education (tenured), July 2006-2015 • K.P. Chao Professor, Professor of Marketing and Statistics (tenured), July 2005-June 2006. • Associate Professor of Marketing and Statistics (tenured), July 2000-June 2005 • Assistant Professor of Marketing and Statistics, July 1996 – June 2000 • Lecturer, Statistics Department, January 1995 – May 1996 • Academic Director, Wharton Small Business Dev. Center, March 2002-June 2008 • Wharton Risk Center Fellow, February 2007- • Senior Fellow, Leonard Davis Institute of Health Economics, 2007- • Co-Director, Wharton Interactive Media Initiative, March 2008-December 2010 • Faculty Director, Wharton Customer Analytics Initiative, January 2011-	

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	• University of Pennsylvania Fellow, 2009-2011 • Fellow, Warren Center in Network and Data Sciences, Penn School of Engineering, 2013- • Academic Fellow, Marketing Science Institute, 2020- • Fellow, INFORMS Society for Marketing Science	
Research Interests	• Probability models for Marketing data • Applied Bayesian modeling • Missing data problems • Choice modeling • Statistical models for unique data structures	
Work Experience	GBH INSIGHTS, LLC December 2015- Co-Founder and Chief Research Officer • Business Intelligence • Marketing Research • Custom Analytics EDUCATIONAL TESTING SERVICE Associate Research Scientist, September 1994 - June 1996 Statistics and Psychometric Research Division • Bayesian Item Response Models • Testlet Models • Computerized Adaptive Testing	New York, NY
	E.I. DuPONT de NEMOURS & CO. May 1991 - August 1994 Statistician and Doctoral Research Fellow, Corporate Marketing and Business Research Division. Full time May 1991 - September 1992 while living in Wilmington. Part time Consultant September 1992 - August 1994 • Analysis of Categorical Survey Data (Multivariate Analysis, Logistic Regression, OLS Regression, Factor Analysis, Bayesian Modeling, etc.) • Experimental Design • Consultant to Corporate Management • Developed corporate metrics • Implemented a new "one page trade off" grid technique	Wilmington, DE
	RENT BUREAU, LLC June 2007- Statistician, Research Fellow, and Equity Partner • Address the predictive nature of monthly rental data on future rental behavior. • Business Strategy and Consulting	Atlanta, GA

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	INVITE MEDIA, INC [Sold to Google] August 2007- June 2010 Chief Scientist - Responsible for all statistical projects - Targeted banner advertising using click-through and social network data. - Business Strategy and Consulting	Philadelphia, PA
	OFFICE ARROW, INC. July 2008-July 2011 Statistical and Business Consultant Responsible for improving business model for social networking website	Atlanta, GA
	STRATEGIC DATA CORPORATION September 1999-September 2001 [Sold to Fox Media Interactive] Chief Scientist - Development of targeted banner advertising engine Statistical Consulting Board Memberships - Wanderfly.com - Passionate Research - FABeetle.com - Clean Slate, Inc. NOMI, INC. - Academic Advisor and Statistical Consultant on Path Modeling	Santa Monica, CA
Awards	4 time winner (1988-1991), Harvard University Derek Bok Center for excellence in teaching - E.I. DuPont de Nemours and Company young researcher award, Corporate Marketing Division, 1992 - Appointed Research Consultant, AT&T Bell Laboratories, 1997 - Finalist 1997 American Statistical Association Savage Award Dissertation Prize 1998, 1999, 2001, 2012, 2013 Wharton MBA Core Curriculum Teaching Award 1999, 2000, 2001, 2002, 2007, 2008 Miller-Sherrerd MBA Core Teaching	

	Award
	• Invited Speaker and Spokesperson for μαθ, national mathematics high school honor society, 2001
	• 2001-2002, 2004-2005, 2006-2007, 2010-2011, 2013-2014 Helen Kardon Moss Anvil Award Finalist
	• 2003, 2004, 2005, 2006, 2013, 2014, 2015, 2016 Wharton School, MBA Excellence in Teaching Award
	• 2003 AERA Outstanding Reviewer
	• 2003 Wharton West WEMBA Teaching Award
	• 2004 Wharton School, Undergraduate Excellence in Teaching Award
	• Finalist, Paul E. Green Award for the best paper in Journal of Marketing Research, 2004.
	• Appointed Fellow of the American Statistical Association, 2005
	• 2006, 2007, 2008 Wharton East WEMBA Teaching Award
	• 2006, 2007, 2008, 2011, 2012, 2014, 2015, 2018 "Goes Above and Beyond the Call of Duty" Wharton MBA Teaching Award
	• 2006 NCME Technical or Scientific Contribution to the Field of Educational Measurement: Development of Testlet Response Theory
	• 2006, 2007 Outstanding Reviewer -- Journal of Educational and Behavioral Statistics.
	• Winner of the 2006 Research Committee of the Society of General Internal Medicine Best Paper Award.
	• Winner, American Marketing Association, EXPLOR Award (2007)
	• Finalist, John D.C. Little Award (2008) for best paper in *Marketing Science* or *Management Science*
	• Appointed Fellow of the American Educational Research Association, (2009).
	• Appointed Inaugural Fellow of the University of Pennsylvania, (2009)
	• Finalist, H. Paul Root Award (2009), Best Paper in *Journal of Marketing*.
	• Named Top-5 Business School Professor, *Financial Times* (2010)
	• Finalist, Paul E. Green Award for the best paper in Journal of Marketing Research, 2011, 2015.
	• Finalist, Steenkamp Award for Long-Term Impact, International Journal of Research in Marketing, 2015.
	• Winner, Helen Kardon Moss Anvil Award for MBA teaching.
	• Winner, Donald Lehmann Award for Best Dissertation Paper Journal of Marketing or Journal of Marketing Research (2016)
	• Winner, IJRM (2016) Jan-Benedict Steenkamp Paper Award for Long-term Impact
	• Winner John D.C. Little Award, Best Paper, *Marketing Science*, (2017)
	• Finalist, Davidson Award, Best Paper, *Journal of Retailing* (2018)
	• Provost's Award for Distinguished PhD Teaching and Mentoring (2020)
Professional Associations	• Board Member, American Marketing Association, 2013-2016.
	• Co-Editor, Replication Corner, *Marketing Letters*, 2012-
	• Area Editor, *Journal of Marketing Research*, 2012-

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	115) Bradlow, E.T. (2008), "Editorial: Maximizing Impact via Database Submissions", *Marketing Science*, July-August, Vol. 27, no 4, 541.
	116) Bradlow, E.T. and Coughlan, A.T. (2009), "Analytical Transparency", *Marketing Science*, May-June, Vol 28, 403-404.
	117) Bradlow, E.T. (2010), "It's Never Goodbye to Marketing Science", *Marketing Science*, Nov-Dec,Vol 29, Part 6, page 963.
	118) Gordon, B.R., Thomadsen, R., Bradlow, E.T., Dube, J.P., and Staelin, R. (2011), "Revisiting the Quantitative Marketing and Structural Economics Workshop", *Marketing Science*.
Submitted Papers	119) Novak, J., Feit, E.M., Jensen, S.T. and Bradlow, E.T., (2020) "Bayesian Imputation for Anonymous Visits in CRM Data", *Marketing Science, revise and resubmit*.
	120) Phan, T, Bradlow, E. T. and Feit, E.M. (2020), "An Integrated Model for Dynamic Brand Equity", *Marketing Science, revise and resubmit*.
	121) Stourm, V., Bradlow, E.T. and Fader, P.S. (2020), "Market positioning

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	using cross-reward effects in a coalition loyalty program", *Journal of Marketing Research, revise and resubmit.* 122) Gopalakrishnan, A., Bradlow, E.T. and Fader, P.S. (2020), Limited Dynamic Forecasting of Hidden Markov Models, Revise and Resubmit *Management Science*. 123) Lu, T, Bradlow, E.T., and Hutchinson, J.W. (2020), "Multiple Dimensions of Binging: The Hidden Costs and Benefits", *Management Science*. 124) Lu, T., Bradlow, E.T., and Hutchinson, J.W. (2020), "Testing Theories of Goal Progress in Online Learning", *Journal of Marketing Research, 2nd round*. 125) Kim, M., Bradlow, E.T., and Iyengar, R. (2020), "Selecting Data Granularity Using the Power Likelihood", *Marketing Science*. 126) Lee, S., Glaze, C.M., Bradlow, E.T. and Kable, J.W., (2020) "Agnostic Utility Function Approximation via Cubic Bezier Splines", *Psychometrika.* 127) Jain, A. and Bradlow, E.T. (2020), "A Hierarchical Bayesian Approach for Tagged Playlist Generation", *Journal of Applied Statistics.*
Papers in Progress	Working on a multitude of papers on branding, advertising effectiveness, and learning models.
Doctoral Supervisor	• Du, Z., Education Department, Columbia University (1998), Winner of AERA Division D – Mary Catherine Ellwein Outstanding Dissertation Award, 2002 American Psychological Association Division 5 Distinguished Dissertation Award • Cain, Lisa B., Marketing Department, The Wharton School, co-chair with Len Lodish (2001) • Musalem, Andres, Marketing Department, The Wharton School, co-chair with Jagmohan Raju (2006) • Schweidel, David, Marketing Department, The Wharton School, co-chair with Peter S. Fader (2006) • Hui, Sam, Marketing Department, The Wharton School, co-chair with Peter S. Fader (2008), Winner of Levy and Weitz Doctoral Dissertation Competition, AMA John A. Howard Dissertation Award, Honorable Mention Winner Academy of Marketing Science - Mary Kay Dissertation Competition, Finalist George B. Dantzig Dissertation Prize in Operations Research. • Zhang, Yao, Statistics Department, The Wharton School, co-chair with Dylan Small (2012) • Schwartz, Eric ,Marketing Department, The Wharton School, co-chair with Peter S. Fader (2013), Honorable Mention, 2012 MSI Alden G. Clayton Doctoral Dissertation Proposal Competition • Wang, Pengyuan, Statistics Department, The Wharton School, co-chair with Ed George (2013) • Affandi, Raja, Statistics Department, The Wharton School, co-chair with Emily Fox (2014). • Gopalakrishnan, Arun, Marketing Department, The Wharton School, co-chair with Peter S. Fader (2015) • Novak, Julie, Statistics Department, The Wharton School, co-chair with Shane Jensen (2015)

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	• Stourm, Valeria, Marketing Department, The Wharton School, co-chair with Peter S. Fader (2016), Honorable Mention – AMA Mathew Joseph Emerging Scholar Award, Honorable Mention, 2015 MSI Alden G. Clayton Doctoral Dissertation Proposal Competition. • Stourm, Ludovic, Marketing Department, The Wharton School, co-chair with Raghu Iyengar (2016). • Phan, Tung, Statistics Department, The Wharton School, co-chair with Shane Jensen (2016) • McCarthy, Daniel, Statistics Department, The Wharton School, co-chair with Shane Jensen (2017). Winner, ISMS Dissertation Award, Winner Alden G. Clayton Dissertation Prize. • Yang, Katie, Marketing Department, The Wharton School, co-chair with Peter Fader (2017) • Lu, Tong, Marketing Department, The Wharton School, co-chair with Wes Hutchinson (2018) • Lee, Sangkil, Psychology Department, University of Pennsylvania, co-chair with Joe Kable (2020) • Yu, Qi, Marketing Department, University of Pennsylvania, co-chair with Ron Berman (2021)
Doctoral Committees	• Zhou, H., Statistics Department, The Wharton School (1997) • Kostritskaya, K., Statistics Department, The Wharton School (1998) • Wang, Y., Statistics Department, The Wharton School (1998) • Moe, Wendy, Marketing Department, The Wharton School (2000) • Ming, Kewei, Statistics Department, The Wharton School (2000) • Diaz-Tena, Nuria, Statistics Department, The Wharton School (2001) • Deepak, Sri Devi, Marketing Department, Columbia University (2001) • Park, Young-Hoon, Marketing Department, The Wharton School (2001) • Eisenstein, Eric, Marketing Department, The Wharton School (2002) • Chen, Pei-Yu, OPIM Department, The Wharton School (2002) • May, Henry, School of Education, The University of Pennsylvania (2002) • Zhang, Ren, Statistics Department, The Wharton School (2002) • Janakiraman, Narayan, Marketing Department, The Wharton School (2003) • Hu, Ye, Marketing Department, The Wharton School (2004) • Sangyoung Song, Marketing Department, The Wharton School (2005) • Donovan, Mark, Department of Biostat, The University of Pennsylvania (2006) • Braun, Michael, OPIM Department, The Wharton School (2006) • Xu, Xinyi, Statistics Department, The Wharton School (2006) • Machin, Jane Marketing Department, The Wharton School (2006) • de Jong, Martijn G., Marketing Department, Tilburg University (2006) • Baldwin, Su, Department of Education, University of Mass-Amherst (2007) • Harik, Polina, Department of Education, University of Delaware (2008) • Wang, Lie, Statistics Department, The Wharton School (2008) • Verrochi, Nicole, Marketing Department, The Wharton School (2009) • McShane, Blake, Statistics Department, The Wharton School (2010) • Luming Wang, Marketing Department, University of Alberta (2010) • Bhattarcharjee, Amit, Marketing Department, University of Pennsylvania (2012) • Bedev, Anton, Economics Department, University of Pennsylvania (2013) • Yang, Fan, Statistics Department, The Wharton School (2013)

	• Li, Ke, Marketing Department, Temple University (2013) • Lee, Jae Young, Marketing Department, The Wharton School (2014) • Li, Hui, Economics Department, University of Pennsylvania (2015) • Wei, Max, Economics Department, University of Pennsylvania (2015) • Li, Kathleen, Marketing Department, The Wharton School (2018) • Sunada, Takeaki, Economics Department, University of Pennsylvania (2019) • Pan, Qi, Economics Department, University of Pennsylvania (2019) • Li, Minshen, Economics Department, University of Pennsylvania (2019) • Fan, Jeremy, Marketing Department, University of Pennsylvania (2020) • Pavlov, Vladimir, Marketing Department, University of Pennsylvania (2021)
University Service	• Participant, Faculty International Seminar in Korea, 1997 • Wharton MBA Curriculum Committee, 1997 • Moderator, Marketing Panel, Wharton Women in Business, October 1997 and October 1998 • Faculty Advisor, American Marketing Association, Wharton School 1996-1997 • MBA Advisor, Wharton Marketing Department, 1998- • Doctoral Committee Marketing Department 1997- • Computer Committee, Marketing Department 1997, 1998, 1999, 2000, 2007, 2008 • Chair Computer Committee, Marketing Department 2003-2004, 2007- • Faculty Recruiting Committee, Marketing Department 1999, 2000, 2002, 2004, 2008 • Chair, Faculty Recruiting Committee, Marketing Department 2001, 2004 • Chair, Senate Committee on the Economic Status of the Faculty 2001-2003 • Co-Course Head for MGMT 653, Field Application Project course • Senate Committee on the Economic Status of the Faculty 2001-2004 • University Council Committee on Personal Benefits, 2002-2003, 2007-2008. • University (Provost) Committee on Retirement Benefits, 2004 • Academic Director, Wharton Small Business Development Center, 2002-2008 • Wharton School Undergraduate Research Fellows Program, Advisor 2004. • MBA Cohort Mentor, 2003-2006. • Dean's Taskforce on the Undergraduate Curriculum, 2003-2004. • 2005-2006 Wharton Committee on Academic Freedom and Responsibility • 2005-2009 Wharton Research Data Services Advisory Board • 2005 Wharton Core Faculty Advisory Committee • 2003-2009 University of Pennsylvania, Faculty Senate • 2006-2009 University of Pennsylvania, University Council • 2006 Wharton West Q-Review Committee • 2007 Weiss Center Quinquennial Review Committee Chair • 2007, 2008 Wharton Executive MBA Committee • 2007-2008, Chairperson, Wharton Committee on Academic Freedom and Responsibility • 2008, University Committee on Personnel Benefits • 2008, Committee MBA Experience and Engagement Committee • 2009, University of Pennsylvania Provost Search Committee • 2009-2011, University of Pennsylvania Academic Planning and Budgeting Committee • 2009, University of Pennsylvania Patent Policy Committee • 2011, Review Committee for Center for Health Care Outcomes Research,

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	University of Pennsylvania, School of Medicine • 2011, University of Pennsylvania, Vice Provost for Research, Research Endowment Committee • 2012-2013, University Council Committee on Personnel Benefits • Wharton Dean's Advisory Council, 2014-
Wharton Teaching Record	• Statistics 101 (introductory statistics), as Visiting Lecturer, September 1994 • Statistics 111 (introductory statistics) as Visiting Lecturer, September 1995 • Marketing 212 (marketing research), Fall 1996, Spring 2003 • Marketing 612 (2013-2019) – Marketing Core Strategy • Marketing 613 (2013) – Marketing Core Simulation • Marketing 621 (marketing essentials), Fall 2006, Fall 2007, WEMBA Spring 2008 • Marketing 622 (marketing management), Core Class (3 Sections), Spring 1998, Spring 1999, Spring 2000, Spring 2001, Spring 2005, Spring 2006, Spring 2007, WEMBA 2005, WEMBA 2006, WEMBA 2007, Spring 2011. • Marketing 756 (marketing research), Fall 1996, Fall 1998, Spring 2003 (WOMBA and WEMBA WEST), Fall 2003 (WEMBA WEST), Spring 2004, Summer 2004 (WEMBA WEST), Spring 2005 • Statistics 500 (Regression and ANOVA), Fall 2000 • Management 653 (Field Application Project), 2000-2001 • Marketing 964 (PhD Empirical Models in Marketing), Spring 2014-Spring 2019 • Marketing 966 (PhD Data Analysis), Spring 1999-2007
Papers Presented	"Hierarchical Models for Customer Satisfaction Questionnaire Data," Contributed Paper presented August 1993 at the Joint Statistical Meetings, San Francisco, CA "A Bayesian Model for Ordinal Survey Responses," Invited Talk presented January 1994 at Dept. of Biostatistics, Harvard University "Case Influence Analysis in Bayesian Inference," Invited Talk presented April 1995 at Dept. of Statistics, The Pennsylvania State University "Analysis of Ordinal Survey Data with 'No Answer' Responses," Invited Talk presented June 1995 at Interface95 conference, Pittsburgh PA "Negative Information and the Three-Parameter Logistic Model," Contributed Paper presented August1995 at the Joint Statistical Meetings, Orlando, FL "Case Influence Analysis in Bayesian Inference," Invited Talk presented July 1996, SISC - Interface96, Sydney, Australia "Error Rates Due to Rescoring Tests," August 1996, Joint Statistical Meetings, Chicago, IL "Item Response Theory Models Applied to Data Allowing Examinee Choice," Invited Talk presented March 1997, Duke University, Department of Statistics "Analysis of Ordinal Survey Data," Invited Talk presented at the Ohio State University, May 1997 "Posterior Predictive Outlier Detection Using Sample Reweighting," Invited Talk,

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	INFORMS meeting, Dallas, Texas, October 1997
	"The Variety of an Assortment," Invited Talk, Cornell University, Marketing Department, December 1997
	"The Variety of an Assortment," Invited Talk, University of Chicago, Marketing Department, January 1998
	"A Hierarchical Latent Variable Model for Ordinal Customer Satisfaction Data with No Answer Responses," Invited Talk, Temple University, Marketing and Statistics Department, February 1998
	"The Variety of an Assortment," Invited Talk, UCLA, Marketing Department, March 1998
	"A Hierarchical Bayes Model for Bundle Choices of a Fixed Size," Marketing Science Conference, INSEAD, Fontainebleau, France, July 1998
	"The Little Engines that Could: Modeling the Performance of World Wide Web Search Engines," Joint Statistical Meetings, Dallas, August 1998
	"The Little Engines that Could: Modeling the Performance of World Wide Web Search Engines," The Wharton School Statistics Department, March 1999
	"The Little Engines that Could: Modeling the Performance of World Wide Web Search Engines," Marketing Science Conference, Syracuse, NY, May 1999
	"A Bayesian Random Effects Model for Testlets," Invited Talk, European Meeting of the Psychometric Society, Lueneberg, Germany, July 1999
	"The Little Engines that Could: Modeling the Performance of World Wide Web Search Engines," The Pennsylvania State University, Marketing Department E-commerce Speaker Series, February 2000
	"Closed-Form Bayesian Inference for the Negative Binomial Distribution," The Wharton School Statistics Department, April 2000
	"A Bayesian Lifetime Model for the Hot 100 Billboard Songs," The University of Houston, July 2000
	"Launching New-Nondurables in Japan: Marketing Practices and Marketing Consequences," Joint Statistical Meetings, Atlanta GA, August 2001
	"A Pattern Reinforcement Model for Partial Profile Conjoint," University of Michigan Business School, January 2002
	"A Pattern Reinforcement Model for Partial Profile Conjoint," University of California, Berkeley, Marketing Department, May 2002
	"A Pattern Reinforcement Model for Partial Profile Conjoint," Columbia University Department of Statistics, November 2002

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"An Integrated Model for Who, When, and How Much in Internet Auctions," MIT Ph.D. Camp, September 2003

"An Integrated Model for Who, When, and How Much in Internet Auctions," Yale University, Marketing Department, September 2003

"Spatial Statistics in Marketing": 6th Invitation Choice Conference, University of Colorado at Boulder, June 2004

"Bayesian Estimation of Random Coefficients Choice Models Using Aggregate Data", Tilburg Marketing Camp, December 2004.

"Who's got the coupon? Estimating Consumer Preferences and Coupon Usage from Aggregate Information", Olin School of Business, Washington University in St. Louis, April 2005.

"Bayesian Estimation of Random Coefficients Choice Models Using Aggregate Data", Harvard Business School, May 2005.

"Bayesian Estimation of Random Coefficients Choice Models Using Aggregate Data", Bayes Econometric Conference at Washington University, August 2005.

"Modeling the Acquisition and Retention of Services at a Multi-Service Provider", Joint Statistics Meetings, Minneapolis, MN, August 2005.

"Bayesian Estimation of Bid Sequences in Internet Auctions Using a Generalized Record Breaking Model", NYU Statistics Department, March 2006.

"Bayesian Estimation of Bid Sequences in Internet Auctions Using a Generalized Record Breaking Model", Stanford University, April 2006.

"Bayesian Estimation of Bid Sequences in Internet Auctions Using a Generalized Record Breaking Model", Northwestern University, September 2006.

"Analysis of Path Data in Marketing with Applications to Grocery Shopping", University of Maryland, May 2007.

"Analysis of Path Data in Marketing with Applications to Grocery Shopping", Wharton Alumni Forum, Hong Kong, May 2007.

"Wharton SBDC in Action", Zhejiang University, Hangzhou, China, May 2007.

"Bayesian Estimation of IDS and Stochastic Prisoner's Dilemma Games", QME Conference, Chicago, IL, September 2007.

"Bayesian Estimation of IDS and Stochastic Prisoner's Dilemma Games", University of Houston, Houston, TX, November 2007.

"Bayesian Estimation of IDS and Stochastic Prisoner's Dilemma Games", Emory University, Atlanta, GA, December 2007.

"Bayesian Estimation of IDS and Stochastic Prisoner's Dilemma Games", University

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	of Southern California, Los Angeles, CA, March 2008.
	"Future and Current Directions for Marketing Science", Haring Symposium Keynote Address, University of Indiana, Bloomington, IN, April 2008.
	"Bayesian Estimation of IDS and Stochastic Prisoner's Dilemma Games", Columbia University Marketing Camp, May 2008.
	"Bayesian Structural Estimation of Retail Demand Under Partially Observed Out-of-Stocks", Emory University, September 2008.
	"Bayesian Structural Estimation of Retail Demand Under Partially Observed Out-of-Stocks", University of Rochester, October 2008.
	"Bayesian Structural Estimation of Retail Demand Under Partially Observed Out-of-Stocks", University of Miami, December 2008.
	"Bayesian Structural Estimation of Retail Demand Under Partially Observed Out-of-Stocks", USC, January 2009.
	"Bayesian Structural Estimation of Retail Demand Under Partially Observed Out-of-Stocks", University of Wisconsin, January 2009.
	"Multichannel Forecasting of Media Usage", Johns Hopkins University, September 2010.
	"Clumpiness Measures and Their Applications in Marketing", Harvard University, May 2012
	"Clumpiness Measures and Their Applications in Marketing", Harvard University, October 2012
	"From RFM to RFMC: Clumpiness Measures and Their Applications in Marketing", USC, March 2013
	"From RFM to RFMC: Clumpiness Measures and Their Applications in Marketing", Dartmouth Inaugural Marketing Camp, May 2013.
	"From RFM to RFMC: Clumpiness Measures and Their Applications in Marketing", Temple, September 2014.
	"Bayesian Imputation for CRM Data with Anonymous Visits", Kellogg School of Management, May 2016.
	"Selecting the Correct Data Granularity", Stanford University, April 2019.
	"Selecting Data Granularity Using the Power Likelihood", USC, September 2019.
Executive Education Teaching	Data Mining Seminar, December 1999 "Case Discussion Leader"
	DuPont Customized Program, January and February 2000, "Marketing Strategy"

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	Essentials of Marketing Program 2003-2005	
	Marketing in the Financial Services Industry 2003-2008	
	Morgan Stanley Financial Services Program 2003-2007	
	Management Engineers, 2005	
	Wharton-NFL Program	
	Academic Director, Wharton Philip-Morris Program, 2004-2008	
	Academic Director and Founder, Google Program 2010-	
Additional Teaching Experience	HARVARD UNIVERSITY	Cambridge, MA
	Introduction to Quantitative Methods September 1988 - August 1990 and September 1992 - January 1994 Teaching Fellow. Quantitative Reasoning A (QRA) September 1990 – September 1991: Teaching Fellow:	
	NORTHEASTERN UNIVERSITY	Boston. MA
	Lecturer in Mathematics September 1988 – August 1990 Taught specialized courses for adults over thirty who needed to learn algebra and geometry for work.	
Research Experience	HARVARD UNIVERSITY January 1993 – August 1994	Cambridge, MA
	Research Assistant: Dept. of Health Care Policy. Finding applications of Bayesian Hierarchical Models in Health Care research. Under the direction of Professors Carl N. Morris and Constantine Gatsonis	
	JOSLIN DIABETES CENTER Summer 1989	Boston, MA
	Research Assistant/Statistical Consultant: Developed methods of analyzing large scale longitudinal data sets to help determine the factors that trigger the onset of diabetes in those predisposed to the disease.	
Grants Received	• Awarded Wharton School Sol C. Snider Entrepreneurial Center Research Grant, 1999, $7000 • Awarded Wharton WEBI initiative grant, co P.I. with Professors Reibstein and Kahn to study build-to-order sites, $7,000, 2000.	

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	• Collaborator -- NIH Grant "Study of Pediatric Asthma", P.I. -- Dr. Jeffrey Silber, Health Care Outcomes Research Department, The University of Pennsylvania, 5% time, 2001-2003. • "Research Advisor in Marketing": Development of Management Technologies to Improve Productivity in Mass Consumption Supply Chains: the case of Supermarkets., P.I. – Professor Maximo Bosch, University of Chile, $220,000, 2004- • Statistical and Marketing Consultant: USDA Meat Market Study, 2004-2008, $4.3 Million Dollars: P.I Professor Martin Asher and RTI International. • "Developing methods to tailor depression treatment to older adults", PI – Marsha Wittink, NIH Fund – 400-4312-4-552007-xxxx-2000-2932, $475,000

Appendix B

Documents Considered List

Academic Articles

- Anna E. Tuchman, Harikesh S. Nair, and Pedro M. Gardete, "Television Ad-Skipping, Consumption Complementarities and the Consumer Demand for Advertising," *Quantitative Marketing and Economics* 16, 2017, pp. 111–174.

- Brenda H. Vrkljan and Dana Anaby, "What Vehicle Features Are Considered Important When Buying an Automobile? An Examination of Driver Preferences by Age and Gender," *Journal of Safety Research* 42, 2011, pp. 61–65.

- David H. Furse, Girish N. Punj, and David W. Stewart, "A Typology of Individual Search Strategies Among Purchasers of New Automobiles," *Journal of Consumer Research* 10(4), 1984, pp. 417–431.

- Fiona Scott Morton, Jorge Silva-Risso, and Florian Zettelmeyer, "What Matters in a Price Negotiation: Evidence from the U.S. Auto Retailing Industry," *Quantitative Marketing and Economics* 9, 2011, pp. 365–402.

- Florian Zettelmeyer, Fiona Scott Morton, and Jorge Silva-Risso, "How the Internet Lowers Prices: Evidence from Matched Survey and Automobile Transaction Data," *Journal of Marketing Research* 43(2), 2006, pp. 168–181.

- Fred Mannering, Clifford Winston, and William Starkey, "An Exploratory Analysis of Automobile Leasing by US Households," *Journal of Urban Economics* 52(2002), 2001, pp. 154–176.

- Geoffrey C. Kiel and Roger A. Layton, "Dimensions of Consumer Information Seeking Behavior," *Journal of Marketing Research* 18(2), 1981, pp. 233–239.

- Gilles Laurent and Jean-Noel Kapferer, "Measuring Consumer Involvement Profiles," *Journal of Marketing Research* 22(1), 1985, pp. 41–53.

- James R. Bettman, Mary Frances Luce, and John W. Payne, "Constructive Consumer Choice Processes," *Journal of Consumer Research* 25(3), 1998, pp. 187–217.

- Jason Kuruzovich, Sivia Viswanathan, Ritu Agarwal, Sanjay Gosain, and Scott Weitzman, "Marketspace or Marketplace? Online Information Search and Channel Outcomes in Auto Retailing," *Information Systems Research* 19(2), 2008, pp. 182–201.

- Joseph W. Alba and Howard Marmorstein, "The Effects of Frequency Knowledge on Consumer Decision Making," *Journal of Consumer Research* 14(1), 1987, pp. 14–25.

- Judith Lynne Zaichowsky, "Measuring the Involvement Construct," *Journal of Consumer Research* 12(3), 1985, pp. 341–352.

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- Narasimhan Srinivasan and Brian T. Ratchford, "An Empirical Test of a Model of External Search for Automobiles," *Journal of Consumer Research* 18(2), 1991, pp. 233–242.

- Richard L. Oliver, "Whence Consumer Loyalty?" *Journal of Marketing* 63, 1999, pp. 33–44.

- Sharon E. Beatty and Scott M. Smith, "External Search Effort: An Investigation Across Several Product Categories," *Journal of Consumer Research* 14(1), 1987, pp. 83–95.

- Steven Berry, James Levinsohn, and Ariel Pakes, "Automobile Prices in Market Equilibrium," *Econometrica* 63(4), 1995, pp. 841–890.

Books and Book Chapters

- Biljana Juric, Sandra D. Smith, and George Wilks, "Negative Customer Brand Engagement," in *Customer Engagement: Contemporary Issues and Challenges*, eds. Roderick J. Brodie, Linda D. Hollebeek, and Jodie Conduit, (Milton Park, UK: Routledge, 2016), pp. 278–289.

- Hal R. Varian, *Intermediate Microeconomics: A Modern Approach,* (New York, NY: W. W. Norton & Company, 2014).

- Henry Assael, *Consumer Behavior: A Strategic Approach* (Boston, MA: Houghton Mifflin Company, 2004).

- "Low-Involvement Versus High-Involvement Buying Decisions and the Consumer's Decision-Making Process," in *Principles of Marketing,* (Minneapolis, MN: University of Minnesota Libraries Publishing, 2010), pp. 76–84.

- Philip Kotler and Kevin Lane Keller, *Marketing Management*, (Harlow, England: Pearson Education Limited, 2016).

Legal Documents

- First Amended Class Action Complaint, *Jason Counts, et al. v. General Motors LLC, et al.,* Case No. 1:16-CV-12541-TLL-PTM, filed June 11, 2018.

Expert Reports

- Declaration of Venkatesh Shankar, Ph.D., November 6, 2019, and all backup materials, documents cited, and documents considered in the Shankar Declaration.

- Expert Report of Kimberly A. Neuendorf, June 5, 2020.

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Depositions

- Deposition of Jason Counts, October 1, 2018.

- Deposition of Oscar Zamora, May 12, 2019.

- Deposition of Derek Long, June 4, 2019.

- Deposition of Venkatesh Shankar, January 23, 2020.

Bates Stamped Documents

- GMCOUNTS000065415–434.

- GMCOUNTS000440021–57.

Public Press and Web Content

- "Vehicle Brands," *General Motors*, available at https://www.gm.com/our-brands, accessed June 5, 2020.

- Alex Kantrowitz, "56% of Digital Ads Served Are Never Seen, Says Google," *AdAge,* December 3, 2014, available at https://adage.com/article/digital/56-digital-ads-served-google/296062, accessed June 5, 2020.

- Daniel Newman, "Customer Experience is the Future of Marketing," *Forbes,* October 13, 2015, available at https://www.forbes.com/sites/danielnewman/2015/10/13/customer-experience-is-the-future-of-marketing/#bd1cc4a193d5, accessed June 5, 2020.

- Michael Martinez, "Social Media Not Important to New Car Buyers," *The Detroit News*, February 20, 2015, available at http://www.detroitnews.com/story/business/autos/2015/02/20/car-buyers-use-social-media/23749555/, accessed June 5, 2020.

- Tim Peterson, "Google Says 46% of Web Video Ads Are Never Viewed," *AdAge*, May 8, 2015, available at http://adage.com/article/digital/google-46-web-s-video-ads-viewed/298513/, accessed June 5, 2020.

Publicly Available Reports

- David Greene, Anushah Hossain, Julia Hofmann, Gloria Helfand, and Robert Beach, "Consumer Willingness to Pay for Vehicle Attributes: What is the Current State of Knowledge?", U.S. Environmental Protection Agency, December 2018.

- Ericsson and ConsumerLab, "TV and Media 2015: The Empowered TV and Media Consumer's Influence," Ericsson Consumer Insight Report, September 2015.

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- Thomas Klier and Joshua Linn, "Technological Change, Vehicle Characteristics, and the Opportunity Costs of Fuel Economy Standards," MIT Center for Energy and Environmental Policy Research, December 2013.